REMARKS

Claims 8–20 are pending in the present application.

Claim 16 was amended herein.

Reconsideration of the claims is respectfully requested.

Restriction

In response to the Restriction Requirement, Applicants provisionally elect the claims of Group II, claims 8–20, WITH TRAVERSE.

The Restriction Requirement asserts that the product and process are distinct because "etching, instead of chemical mechanical polishing, could be used to remove portions of the protective barrier layer." However, independent structure claim 8 does not require removal of any portion of the protective barrier layer, but instead reads on the structure prior to chemical mechanical polishing. For this reason, the restriction requirement is respectfully traversed.

35 U.S.C. § 102 (Anticipation)

Claims 8 and 10–14 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,060,787 to *Zhao et al.* Claims 16–18 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,436,814 to *Horak et al.* These rejections are respectfully traversed.

A claim is anticipated only if each and every element is found, either expressly or inherently described, in a single prior art reference. The identical invention must be shown in as complete detail as is contained in the claim. MPEP § 2131 at p. 2100-73 (8th ed. rev. 2 May 2004).

Independent claim 8 recites "a protective barrier layer over the tungsten layer and within the openings, wherein the protective barrier layer comprises a material for which removal by chemical mechanical polishing is primarily mechanical" (emphasis added). Such a feature is not found in the cited reference(s), taken alone or in combination. The Office Action equates the "third protective CVD tungsten layer" 307 in *Zhao et al* (also referred to in *Zhao et al* as "nucleation layer 307") with the recited protective barrier layer. However, as taught in the specification, tungsten removal by chemical mechanical polishing is known to be primarily chemical in nature, resulting in uniform removal of conformal layers and "dishing." Specification, page 3, lines 14–19. *Zhao et al* reinforces that teaching:

> [T]he fine grain size and equiaxed grain structure of this nucleation layer 307 make it more resistant and more uniform in response to slurry attack than the underlying bulk tungsten layer 306. As a result, the deposition trench 312 remains a consistent and reliable alignment mark.

Zhao et al, column 6, lines 13–18. Thus, *Zhao et al* teaches away from the claimed invention by teaching use of a material for which removal by chemical mechanical polishing is primarily chemical (and therefore more uniform, preserving the underlying topography), rather than primarily mechanical as recited in the claim (promoting planarization of the underlying topography).

The Office Action cites *Horak et al* as teaching that "tungsten is well known to provide [a] barrier function." Paper No. 20040819, page 4 (citing *Horak et al*, column 5, lines 34–52). However, *Horak et al* teaches that (a) conformal liner 510 is meant to protect against the aggressive oxidizing of insulator 310 by tungsten layer 520, NOT that conformal liner 510 is formed of

tungsten, and (2) conformal liner 510 serves as an oxidation barrier, not as a protective barrier for removal by chemical mechanical polishing:

> Conformal conductor liner 510 would be the protective barrier lining the sidewalls of opening 340 and recess 330, and would be between conformal conductor 520 and insulator 310. For example, if conformal conductor 520 was CVD tungsten, conformal conductor liner 510 would prohibit the very aggressive oxidizing chemistry of CVD tungsten from affecting insulator 310 or any other underlying materials.

Horak et al, column 5, lines 36–42.

Independent claim 16 recites that the protective barrier layer overlies only a central region of the tungsten within the opening, not peripheral regions of the tungsten. Such a feature is not found in the cited reference. *Horak et al* depicts conformal liner 510 as overlying the entire upper surface of tungsten plug 230.

Therefore, the rejection of claims 8, 10–14 and 16–18 under 35 U.S.C. § 102 has been overcome.

35 U.S.C. § 103 (Obviousness)

Claim 9 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Zhao et al* in view of *Horak et al*. Claim 15 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Zhao et al* in view of U.S. Patent No. 6,346,741 to *Van Buskirk et al*. Claim 19 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Horak et al* in view of U.S. Patent No. 5,889,328 to *Joshi et al*. Claim 20 was rejected under 35 U.S.C. § 103(a) as being unpatentable over *Horak et al* in view of *Van Buskirk et al*. This rejection is respectfully traversed.

In *ex parte* examination of patent applications, the Patent Office bears the burden of establishing a *prima facie* case of obviousness. MPEP § 2142, p. 2100-128 (8th ed. rev. 2 May 2004). Absent such a *prima facie* case, the applicant is under no obligation to produce evidence of nonobviousness. *Id.*

To establish a *prima facie* case of obviousness, three basic criteria must be met: First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *Id.*

With regard to claim 9, as noted above *Horak et al* teaches that the conformal liner 510 is between tungsten 520 and insulator 310, NOT that the conformal liner 510 IS tungsten. Accordingly, *Horak et al* does NOT suggest that tungsten and titanium are interchangeable as asserted in the Office Action.

With regard to claim 15, as noted above *Zhao et al* does not teach or suggest "all of the elements of the claims except the opening in the dielectric being sized to form a capacitive electrode from the tungsten within the opening" as asserted in the Office Action.

With regard to claims 19–20, as noted above *Horak et al* does not teach or suggest "all of the elements of the claims except the tungsten and the barrier layer form an upper surface which is planar with an upper surface of the dielectric layer" and "the opening in the dielectric being sized to form a capacitive electrode from the tungsten within the opening" as asserted in the Office Action.

Therefore, the rejection of claims 9, 15 and 19–20 under 35 U.S.C. § 103 has been overcome.

If any issues arise, or if the Examiner has any suggestions for expediting allowance of this Application, the Applicant respectfully invites the Examiner to contact the undersigned at the telephone number indicated below or at ***dvenglarik@davismunck.com***.

The Commissioner is hereby authorized to charge any additional fees connected with this communication or credit any overpayment to Deposit Account No. 50-0208.

Respectfully submitted,

DAVIS MUNCK, P.C.

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Daniel E. Venglarik
Registration No. 39,409

P.O. Box 802432
Dallas, Texas 75380
(972) 628-3621 (direct dial)
(972) 628-3600 (main number)
(972) 628-3616 (fax)
E-mail: *dvenglarik@davismunck.com*